Cervical cancer screening among U.S. women: analyses of the 2000 National Health Interview Survey [☆]

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Abstract

Background. Cervical cancer screening is not fully utilized among all groups of women in the United States, especially women without access to health care and older women.

Methods. Papanicolaou (Pap) test use among U.S. women age 18 and older is examined using data from the 2000 National Health Interview Survey (NHIS).

Results. Among women who had not had a hysterectomy ($n = 13,745$), 83% reported having had a Pap test within the past 3 years. Logistic regression analyses showed that women with no contact with a primary care provider in the past year were very unlikely to have reported a recent Pap test. Other characteristics associated with lower rates of Pap test use included lacking a usual source of care, low family income, low educational attainment, and being unmarried. Having no health insurance coverage was associated with lower Pap test use among women under 65. Despite higher insurance coverage, being age 65 and older was associated with low use. Rates of recent Pap test were higher among African-American women.

Conclusions. Policies to generalize insurance coverage and a usual source of health care would likely increase use of Pap testing. Also needed are health system changes such as automated reminders to assist health care providers implement appropriate screening. Renewed efforts by physicians and targeted public health messages are needed to improve screening among older women without a prior Pap test.
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Introduction

Cervical cancer is one of the most preventable of cancers, and widespread adoption of the Papanicolaou (Pap) test can be credited with halving the annual malignant cervical cancer incidence rate (from 17.2 to 8.0 per 100,000) and mortality rate (from 6.2 to 2.9) from 1973 to 1999 [1–3]. Even so, in 2000 there were an estimated 12,800 new U.S. cases of cervical cancer and 4,600 deaths due to cervical cancer [4]. One-half of women with newly diagnosed invasive cervical cancer have never had a Pap test, and another 10% have not had a test in the past 5 years [1].

This study takes advantage of data from the latest National Health Interview Survey (NHIS) Cancer Control Supplement to identify which women are not being tested and the reasons they report for not having been tested. It is important to identify which women are not being tested because although overall national rates of Pap testing are high [5–7], rates are much lower among certain groups of women, for example, those who lack insurance or a usual source of care [5,7–9]. Programs, policies, and interventions are needed to specifically target groups of women with lower rates.

In addition to sociodemographic and health care access indicators that have been shown to be predictors of screening use, the 2000 NHIS included several

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measures of health status and cancer risk, and analyses are presented showing Pap test use by disability status, prior history of cancer, perceived risk of cancer, and smoking status. Previous research has shown higher rates of cervical cancer screening among women with a family history of cancer [7], and lower rates of use among women who have disabilities [10,11] or who currently smoke [7]. The NHIS provides valuable information on reasons why women without a recent Pap test are not tested and whether such women had received a recommendation to be tested from a doctor or health professional. The NHIS is the official assessment tool for the Department of Health and Human Services' "Healthy People" objectives related to cervical cancer [12,13]. The 2000 objective was to increase to at least 85% the proportion of all women age 18 and older who had received a Pap test within the preceding 3 years [12].

Methods

Data sources

The NHIS is a principal source of information on the health of the U.S. noninstitutionalized, civilian household population [14]. The survey provides national data on the incidence of illness and accidental injuries, the prevalence of chronic conditions and impairments, the extent of disability, and the utilization of health care services derived from personal interviews in the home. A Cancer Control Module to the 2000 NHIS was administered to 32,374 individuals age 18 and older, 18,388 of them women.

Measurement of the use of Pap tests

Women were asked if they had ever had a Pap test and the timing of their most recent test. For our

Table 1
Number and distribution of women age 18 and older by sociodemographic characteristics, and percent who reported ever receiving a pap test, and receiving a pap test within the past 3 years (excluding women reporting hysterectomy), National Health Interview Survey, 2000

Characteristic	Sample size	National estimate (in 1,000s)	Percent distribution	Percent using Pap test ever (standard error)	Percent using Pap test within 3 years (standard error)[a]
All women	13,745	79,691	100.0	92.6 (0.3)	83.3 (0.4)
Age	13,745	79,691	100.0		
18–24	1,779	12,554	15.8	75.6 (1.4)	73.7 (1.5)
25–44	6,525	36,994	46.4	96.1 (0.3)	88.7 (0.5)
45–64	3,350	20,020	25.1	97.3 (0.3)	86.8 (0.7)
65–74	1,005	5,212	6.5	94.8 (0.7)	75.6 (1.6)
75+	1,086	4,911	6.2	87.6 (1.1)	60.5 (1.7)
Race/ethnicity[b]	13,745	79,692	100.0		
Hispanic	2,495	8,892	11.2	85.0 (1.1)	77.9 (1.2)
Non-Hispanic white	8,638	57,742	72.5	94.2 (0.3)	84.3 (0.5)
Non-Hispanic black	2,121	9,681	12.1	94.3 (0.7)	86.9 (0.9)
Non-Hispanic other	491	3,377	4.2	78.8 (2.3)	68.9 (2.5)
Birthplace	13,745	79,691	100.0		
United States	11,347	68,371	85.8	94.1 (0.3)	84.7 (0.4)
Outside of United States	2,398	11,320	14.2	83.3 (1.0)	74.9 (1.2)
Marital status	13,713	79,570	100.0		
Never married	3,005	15,537	19.5	77.3 (1.2)	71.7 (1.3)
Currently married	6,989	49,472	62.2	96.9 (0.2)	88.9 (0.5)
Formerly married	3,719	14,561	18.3	94.1 (0.5)	76.6 (0.9)
Educational attainment[c]	11,899	66,722	100.0		
Less than high school graduation	2,336	10,216	15.3	90.0 (0.7)	72.4 (1.1)
High school graduation or GED	3,401	19,805	29.7	95.8 (0.4)	82.7 (0.7)
Greater than high school	6,162	36,701	55.0	97.3 (0.2)	90.0 (0.4)
Family income level[d]	13,745	79,691	100.0		
0–149% of poverty level	3,110	13,218	16.6	87.3 (0.9)	73.8 (1.0)
150–299% of poverty level	2,857	16,058	20.2	92.7 (0.7)	81.0 (0.9)
300+ percent of poverty level	4,760	32,430	40.7	95.3 (0.4)	89.7 (0.5)
Unknown	3,018	17,985	22.6	91.2 (0.6)	80.6 (0.8)

[a] Sample size is slightly smaller for use of Pap test within past 3 years (*n* = 13,636) because for some women, the timing of the test was not ascertained.
[b] The categorization of race/ethnicity was according to old Office of Management and Budget guidelines (pre-1997 revisions to OMB Directive 15) for consistency with earlier NHIS survey results. Asian, American Indian/Alaska Native, and Native Hawaiian and Other Pacific Islander were grouped into Non-Hispanic other race due to small sample size.
[c] Descriptive statistics limited to women age 25 and older at time of interview (*n* = 11,899).
[d] Family income level is based on the respondent's combined family income from all sources in the 12 months before the survey divided by 1999 poverty thresholds established by the U.S. Bureau of the Census.

analyses, Pap test use within the past 3 years is assessed. This is the screening interval recommended by the U.S. Preventive Services Task Force [15] and specified in the Healthy People 2000 objectives [12]. When women reported that they had never had a Pap test, or had not received a Pap test in the last 3 years, they were asked to report the most important reason for not having had the test. These women were also asked if a doctor or other health professional had recommended that they have a Pap test.

Measurement of determinants of Pap test use

Most of the questions indicating access to care or risk of cancer were asked directly of the sample adult respondent. Measures of health insurance coverage, general health status, and limitations of activities of daily living were ascertained in the general household portion of the interview where a household proxy response was used if the sample adult was not available. Analytic variables included those related to access to health care

Table 2
Number and distribution of women age 18 and older by indicators of health care access and health risk, and percent who reported ever receiving a pap test, and receiving a pap test within 3 years (excluding women reporting hysterectomy), National Health Interview Survey, 2000

Access/risk indicators	Sample size	National estimate (in 1,000s)	Percent distribution	Percent using Pap test ever (standard error)	Percent using Pap test within 3 years (standard error)[a]
All women	13,745	79,691	100.0	92.6 (0.3)	83.3 (0.4)
Insurance	13,680	79,229	100.0		
Private/military	8,229	52,574	66.4	94.2 (0.4)	88.6 (0.5)
Medicaid	903	3,883	4.9	94.3 (1.1)	86.3 (1.4)
Medicare	2,174	10,470	13.2	91.8 (0.7)	70.0 (1.2)
Other government (e.g., state)	194	1,021	1.3	88.8 (3.6)	83.4 (4.0)
No insurance	2,180	11,281	14.2	85.5 (1.0)	69.8 (1.3)
Has usual source of care[b]	13,742	79,678	100.0		
Yes	12,046	70,522	88.5	93.7 (0.3)	85.7 (0.4)
No	1,696	9,156	11.5	83.9 (1.2)	64.9 (1.5)
Contact with primary care provider in last year[c]	13,739	79,655	100.0		
Yes	11,474	67,130	84.3	94.6 (0.3)	88.4 (0.4)
No	2,265	12,525	15.7	81.5 (1.1)	55.8 (1.4)
Previous history of cancer[d]	13,744	79,687	100.0		
Yes	720	4,087	5.1	97.9 (0.5)	86.0 (1.5)
No	13,024	75,600	94.9	92.3 (0.3)	83.1 (0.4)
Perception of risk of cancer[e]	12,846	74,983	100.0		
Low	7,484	42,584	56.8	91.1 (0.4)	81.5 (0.6)
Medium	3,867	23,751	31.7	94.5 (0.5)	86.1 (0.7)
High	1,495	8,648	11.5	95.5 (0.8)	86.9 (1.1)
Smoking status	13,731	79,630	100.0		
Current	2,929	17,078	21.4	95.7 (0.6)	83.6 (0.9)
Former	2,317	13,971	17.5	96.8 (0.4)	88.1 (0.8)
Never	8,485	48,581	61.1	90.2 (0.4)	81.8 (0.5)
Health status	13,738	79,641	100.0		
Excellent/very good	8,798	53,370	67.0	92.4 (0.4)	85.3 (0.5)
Good	3,388	18,686	23.5	92.6 (0.6)	80.0 (0.8)
Fair/poor	1,552	7,585	9.5	93.4 (0.7)	77.0 (1.3)
Limitation of activities of daily living or functional limitation[f]	13,727	79,614	100.0		
Yes	4,228	23,551	29.6	93.9 (0.5)	79.7 (0.7)
No	9,499	56,063	70.4	92.0 (0.4)	84.8 (0.5)

[a] Sample size is slightly smaller for use of Pap test within past 3 years (*n* = 13,636) because for some women, the timing of the test was not ascertained.

[b] Individuals were categorized as having a usual source of care if they responded affirmatively to "Is there a place that you usually go to when you are sick or need advice about your health?" Individuals who reported usually going to an emergency room were categorized as not having a usual source of care.

[c] Contact with primary care provider in last year includes those with "A general doctor who treats a variety of illnesses (a doctor in general practice, family medicine, or internal medicine", a "doctor who specializes in women's health (an obstetrician/gynecologist)", or a "nurse practitioner, physician assistant, or midwife".

[d] Respondents were asked, "Have you ever been told by a doctor or other health professional that you had cancer or a malignancy of any kind?"

[e] Respondents were asked, "Would you say your risk of getting cancer in the future is low, medium, or high?"

[f] Respondents (or household proxy) were asked, "Because of a physical, mental, or emotional problem, if (person) needed the help of other persons with personal care needs, such as eating, bathing, dressing, or getting around inside this home?" Individuals were categorized as having functional limitations if they reported having any degree of difficulty without using any special equipment with walking a quarter of a mile, about three city blocks; walking up 10 steps without resting; standing or being on your feet for about 2 hours; sitting for about 2 hours; stooping, bending, or kneeling; reaching up over head; using fingers to grasp or handle small objects; lifting or carrying something as heavy as 10 lbs such as a full bag of groceries; pushing or pulling large objects, such as a living room chair; going out to do things such as shopping, movies, or sporting events; participating in social activities, such as visiting friends, attending clubs and meetings, going to parties, relaxing at home or for leisure (reading, watching TV, sewing, listening to music).

(health insurance coverage, having a usual source of care, contact with primary care provider in last year), cancer history and risk factors (previous history of cancer, perception of risk of cancer, smoking status), health and disability status (health status, limitations of activities of daily living, functional limitations), and sociodemographic characteristics (race/ethnicity, birth-place, marital status, educational attainment, family income level) (see table footnotes for descriptions of variables).

Exclusion of women reporting hysterectomy

Current guidelines recommend routine screening with Pap tests for women with a cervix [15,16]. Nearly one-in-five (19.2%) women age 18 and older reported a prior hysterectomy. Reports of a prior hysterectomy increased sharply with age—6.1%, 31.4%, 43.1%, and 40.4% of women age 25–44, 45–64, 65–74, and 75 and older, respectively. Women reporting a hysterectomy were excluded from further analyses.

Statistical analyses

Descriptive statistics and a logistic regression model are presented to assess the relationship between sociodemographic, health status, and health care characteristics and use of Pap tests. The NHIS has a complex survey design involving stratification, clustering, and disproportionate sampling. All proportions and population counts presented are weighted to provide national estimates. Variance estimates for proportions and logistic regression model odds ratios (OR) were calculated by use of the Taylor series approximation technique, taking into account the complex design of the survey [17]. All *P* values are two-sided; if less than 0.05, they are considered statistically significant.

Results

In 2000, 83.3% of women age 18 and older and without a history of hysterectomy reported that they had had a Pap test within the past 3 years (Table 1). Among all women age 18 and older (with and without a history of hysterectomy), 81.3% had had a recent Pap test.

Factors associated with Pap test use

Bivariate analyses as seen in Table 1 suggest that recent Pap test use is significantly higher among women age 25–44 (88.7%), and lower among women of "other" race (68.9%), women who were never married (71.7%), women with less than a high school education (72.4%), and women born outside of the United States (74.9%). Among the health care access and risk measures shown in Table 2, lower Pap test use is associated with no contact with a primary care

Table 3
Among women reporting no Pap test in the last 3 years, main reason for not having the test and receipt of recommendation for Pap test from a doctor or health professional in the last year, by age (excluding women reporting hysterectomy), National Health Interview Survey, 2000

Main reason for not having Pap test	Percent distribution (standard error). Total and by Age group			
	Total (*n* = 2,344)	18–44 (*n* = 1,168)	45–64 (*n* = 484)	65+ (*n* = 692)
No reason/never thought about it	47.9 (1.3)	50.4 (1.8)	39.9 (2.5)	48.6 (2.1)
Doctor did not order it/did not say I needed it	10.1 (0.8)	8.1 (1.1)	4.5 (1.0)	19.5 (1.8)
Have not had any problems	8.9 (0.7)	8.9 (0.9)	11.7 (1.8)	6.6 (1.0)
Too expensive/no insurance/cost	8.7 (0.7)	9.8 (1.0)	15.5 (2.0)	–
Did not need test/did not know I needed test	7.9 (0.7)	6.7 (0.9)	6.7 (1.2)	12.0 (1.5)
Put it off/did not get around to it	7.3 (0.6)	7.8 (0.9)	10.4 (1.6)	3.7 (1.0)
Too painful, unpleasant, or embarrassing	3.5 (0.5)	3.6 (0.9)	3.3 (1.0)	3.4 (0.8)
Do not have doctor	1.7 (0.3)	1.5 (0.4)	3.0 (0.8)	–
Other	3.4 (0.4)	3.0 (0.5)	4.5 (1.0)	3.7 (0.8)
Do not know	0.3 (0.1)	–	–	–
Has usual source of care	(*n* = 2,351)	(*n* = 1,169)	(*n* = 485)	(*n* = 697)
Yes	77.1 (1.0)	72.2 (1.5)	75.5 (2.3)	90.0 (1.3)
No	22.9 (1.0)	27.8 (1.5)	24.5 (2.3)	10.0 (1.3)
Had doctor or health professional visit	(*n* = 2,338)	(*n* = 1,167)	(*n* = 482)	(*n* = 689)
Yes	70.0 (1.3)	67.3 (1.9)	60.7 (2.6)	84.6 (1.7)
No	30.0 (1.3)	32.7 (1.9)	39.3 (2.6)	15.4 (1.7)
Among those with visit, receipt of recommendation	(*n* = 1,644)	(*n* = 756)	(*n* = 297)	(*n* = 591)
Yes	11.8 (0.9)	10.8 (1.4)	22.1 (2.6)	7.4 (1.2)
No	88.2 (0.9)	89.2 (1.4)	77.9 (2.6)	92.6 (1.2)

Note. "–" indicates cell size too small for reliable estimate. Columns may not add to 100.0 due to rounding.

provider in the past year (55.8%), no usual source of care (64.9%), lack of health insurance (69.8%), and being in fair or poor health (77.0%).

Why women have not had a recent Pap test

Table 3 shows data on the subset of women who reported not having a recent Pap test, defined as within 3 years of the interview. The table's first panel shows the main reason women report for not having a recent test. Nearly half of these women (47.9%) specify no main reason. The most common specific main reason given is that a doctor did not order or say that they needed a test (10.1%). Other commonly stated reasons included that they had not had any

problems (8.9%), expense associated with the test (8.7%), not knowing that a test was needed (7.9%), and putting off getting a test (7.3%). Women age 65 and older were more likely than younger women to report that a doctor had not ordered or recommended a test (19.5%) and that they did not know they needed the test (12.0%).

The second and third panel of Table 3 shows that most women who had not had a recent Pap test had a usual source of care (77.1%) and had visited a doctor in the past year (70.0%). The fourth panel of Table 3 presents data on the subset of women who reported they had visited a doctor in the past year. Of those, only 11.8% reported the doctor had recommended a Pap test. Women over age 65 were more likely than younger women to report that they had had contact

Table 4
Odds ratios (ORs) and 95% confidence intervals (CIs) associated with multivariate logistic regression model to identify sociodemographic and health-related characteristics associated with Pap test use in last 3 years among women who had not had a hysterectomy, by age group, National Health Interview Survey, 2000

Characteristic[a]	Value	OR (95% CI)	
		Age 25–64 (n = 9,796)	Age 65 and older (n = 2,041)
Age	25–44	1.00	na
	45–64	*0.74 (0.62–0.89)	na
	65–74	na	1.00
	75 and older	na	*0.54 (0.42–0.68)
Race/ethnicity	Hispanic	*1.42 (1.07–1.87)	1.63 (0.99–2.68)
	Non-Hispanic white	1.00	1.00
	Non-Hispanic black	*2.04 (1.63–2.55)	*1.76 (1.14–2.73)
	Non-Hispanic other	*0.48 (0.35–0.65)	1.55 (0.62–3.90)
Birthplace	United States	1.00	1.00
	Outside of United States	0.79 (0.62–1.01)	0.81 (0.55–1.19)
Marital status	Never married	*0.50 (0.41–0.62)	*0.44 (0.26–0.72)
	Currently married	1.00	1.00
	Formerly married	*0.75 (0.62–0.91)	*0.70 (0.53–0.93)
Educational attainment	Less than high school graduation	*0.70 (0.55–0.89)	*0.75 (0.57–0.99)
	High school graduation or GED	*0.74 (0.61–0.89)	1.09 (0.83–1.43)
	More than high school or GED	1.00	1.00
Family income level	0–149% of poverty level	*0.63 (0.48–0.83)	*0.44 (0.28–0.68)
	150–299% of poverty level	*0.54 (0.42–0.69)	*0.66 (0.44–0.98)
	300+ percent of poverty level	1.00	1.00
	Unknown	*0.76 (0.60–0.95)	*0.57 (0.37–0.86)
Insurance[b]	Yes	1.00	na
	No	*0.54 (0.43–0.67)	na
Has usual source of care	Yes	1.00	1.00
	No	*0.56 (0.45–0.69)	*0.40 (0.25–0.64)
Contact with primary care provider in last year	Yes	1.00	1.00
	No	*0.17 (0.15–0.20)	*0.25 (0.17–0.36)
Previous history of cancer	Yes	0.75 (0.54–1.04)	*0.72 (0.54–0.97)
	No	1.00	1.00
Perceived risk of cancer high	Yes	1.19 (0.91–1.54)	*1.83 (1.15–2.92)
	No	1.00	1.00
Smoking status	Current	1.06 (0.86–1.30)	0.81 (0.55–1.20)
	Former	*1.38 (1.07–1.77)	0.98 (0.74–1.29)
	Never	1.00	1.00
Health status	Excellent/very good	1.00	1.00
	Good	*0.76 (0.63–0.91)	0.83 (0.65–1.05)
	Fair/poor	*0.71 (0.55–0.93)	0.74 (0.52–1.07)
Limitation in Activities of Daily Living (ADL) function	Yes	*0.74 (0.61–0.89)	0.83 (0.64–1.06)
	No	1.00	1.00

Note. 1.00 indicates reference category; * indicates statistically different from 1.00.
[a] See tables 1 and 2 for variable definition.

with a health professional (84.6%); however, a smaller percentage received a recommendation to be tested (7.4%).

Results of multivariate analyses to assess the determinants of Pap test use

Separate logistic regression models were developed for younger women age 25–64 and women age 65 and older. Because 93% of women age 65 and older reported having health insurance through the Medicare program, insurance coverage was not included in the model for older women. Results of the regression model are shown in Table 4. Among both younger and older women, the following factors depressed recent Pap test use: having no contact with a primary care provider in the past year (OR 0.17 and OR 0.25, respectively); not having a usual source of care (OR 0.56 and OR 0.40, respectively); never married (0.50 and 0.44, respectively) or formerly married (0.75 and 0.70, respectively) (relative to being married); having a family income below 300% of the poverty level (e.g., OR 0.63 and 0.44, respectively for family income level below 150% of poverty level); and having less than a high school education (OR 0.70 and 0.75, respectively). Among both younger and older women, African-American relative to white non-Hispanic race/ethnicity was associated with greater Pap test use (OR 2.04 and 1.76, respectively).

In addition to the determinants of Pap test use common to women of all ages mentioned above (i.e., history of contact with a primary care provider, having a usual source of care, African-American race, marital status, family income, educational attainment), factors associated with lower rates of Pap test use among women age 25–64 included being of non-Hispanic other race/ethnicity (OR 0.48), not having health insurance (OR 0.54), less favorable health status (e.g., OR 0.71 for fair or poor health status), and having limitations in activities of daily living or functional limitations (OR 0.74). Women age 45–64 were less likely than women age 25–44 to have had a test (OR 0.74). Among younger women, being Hispanic (OR 1.42) and being a former smoker (OR 1.38) were associated with greater Pap test use.

Among older women, being age 75 or older as compared to age 65–74 was associated with much lower Pap test use (OR 0.54). In addition to the determinants of Pap test use common to women of all ages mentioned above (i.e., history of contact with a primary care provider, having a usual source of care, African-American race, marital status, family income, educational attainment), among older women, having a personal history of cancer was associated with lower test use (OR 0.72), but a perception of having a high personal risk of cancer was associated with greater test use (OR 1.83).

Discussion

In 1990, national health objectives for the year 2000 were established as part of an initiative to invigorate health promotion and disease prevention efforts and bring about measurable improvements in morbidity and mortality. A "Healthy People" objective designed to do this for cervical cancer is to increase to at least 85% the proportion of all women age 18 and older who had received a Pap test within the preceding 3 years [12]. This was not quite achieved. Rates of use did exceed 85%, but only for certain subpopulations, for example, those with private health insurance, a usual source of care, and recent contact with a primary care provider.

Findings from the 2000 NHIS suggest that among younger women, efforts to improve screening rates should target women who are uninsured, poor, and who are "other" race. A number of free or low-cost cancer screening programs are available to low-income and underserved women to increase access to screening. The largest such program is the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) that operates in all states with support from the Centers for Disease Control and Prevention (CDC) [18,19]. From 1991 to 2001, nearly 2 million Pap tests were performed as part of the program. During this period, over 48,000 precancerous cervical lesions and over 800 cervical cancers were diagnosed [Rafel Jackson, Program Analyst, CDC, personal communication to Nancy Breen, September 16, 2002]. Even so, fewer than 15% of women eligible for the program are estimated to be served [18]. Increased support of the NBCCEDP could improve screening among low-income and uninsured women [20]. Providing screening through nontraditional sites (e.g., urgent care centers, work sites) and facilitating screening by in-reach and outreach workers as well as lay health advisers are all promising approaches to improving access to screening [21–25]. In addition, targeted interventions are needed to increase screening rates among women under 65 with disabilities.

Somewhat paradoxically, despite having more access to health insurance coverage and higher rates of contact with health care personnel, women age 65 and older lag behind younger women in obtaining Pap tests. This is of concern because older women account for a disproportionate share of cervical cancer incidence and mortality. Though women 65 and older comprise approximately 13% of the U.S. female population 18 and older (Table 1), an estimated 21% of new cases of invasive cervical cancer and 38% of cervical cancer deaths occur in this age group [3]. With remaining life expectancy at age 65 of 19.1 years, and at age 75 of 12.1 years [26], use of effective preventive health care services would appear to have merit. There is some uncertainty, however, regarding the benefits of screening at older ages, especially for women whose previous Pap tests have been normal [15,16]. The American Cancer Society recently recommended that women age 70 and older stop having Pap tests if they have had three or more consecutive normal tests [16]. The U.S. Preventive

Services Task Force recommends against routinely screening women older than age 65 for cervical cancer if they have had adequate recent screening with normal test results [15].

Lower rates of recent Pap test use among older women would be less of a concern if women at least had a history of being ever screened. Results of the 2000 NHIS show that 9% of older women report never having been screened—5% among women age 65–74 and 12% of women age 75 and older. A history of never having been screened is especially high among older women who are Hispanic (18%), were born outside of the United States (18%), have lower educational attainment (15% among women with less than a high school education), and whose family incomes are less than 150% of the federal poverty level (15%). Older women are much more likely than younger women to report that physicians did not recommend the test, a finding that is consistent with previous research [27,28].

Renewed efforts are needed to help health care providers target underserved women and to avoid missed opportunities for screening. Modifications in health care providers' practices, including use of computerized tracking systems and reminder letters, are effective ways to promote screening and can improve compliance with recommended screening guidelines [29–34].

For both young and older women, likely multiple strategies aimed simultaneously at individuals, health care providers, systems of care, and communities at large will be more successful than single strategies in increasing Pap test rates among underserved women. Such multi-faceted approaches have proven valuable in promoting cancer screening among underserved women for screening mammography [35].

Public health campaigns to encourage women to ask for Pap testing may also be appropriate. Nearly half of the women without a recent test specified no main reason why they had not been tested or reported that they had not thought about it. Relatively few reported the main reason they were not tested was because their doctor had not recommended it. This is surprising in light of the fact that of the 70% of women who reported contact with a health care provider in the past year, 88% reported that a recommendation for screening was not made. Pap testing may not have come up in the context of recent health care contacts because visits were for acute care or were with nonprimary care providers. On the other hand, women may not be familiar with screening guidelines and the role of clinicians in promoting testing. Further investigation is needed to understand why women are not tested and what would motivate testing.

A very positive finding is the relatively high rates of recent screening among African-American and Hispanic women, findings consistent with the literature [5,36,37]. The comparability of recent Pap test use among Hispanic and non-Hispanic white women is consistent with recent research [5,38,39]. In one of the recent studies, Suarez [38] found that once age, income, education, and health insurance status were taken into consideration, indicators of acculturation, such as English language use, lost importance in determining Pap test use among Hispanic women. Of concern is the relatively large proportion of older Hispanic women who report never having had a Pap test. Language and cultural barriers and poor access to health care all might contribute to this trend and to the lower Pap test use observed among women of "other" race (including Asian, Pacific Islander, and Native American descent) [40–42].

Somewhat surprising is that women with a history of cancer are not screened at higher rates. Among older women, those with a history of cancer have significantly lower rates of cervical cancer screening even though older women who perceive they are at higher risk of cancer are more likely to have had a recent Pap test. It may be the case that younger women are routinely tested in the context of reproductive health care while older women may have to actively seek testing either by making an appointment for screening or by requesting the test when visiting their physician.

The Healthy People 2010 goal is to have 90% of women with a recent Pap test and to decrease the cervical cancer mortality rate to 2.0 per 100,000 women (in 1999, it was 2.9 per 100,000) [13]. Improved technologies for cervical cancer screening are available and will likely be disseminated [43–45], but irrespective of the screening test used, improved access to care and consistent recommendations for cervical cancer screening by providers will be needed to close the remaining gaps in screening test use and meet Healthy People 2010 goals.

Limitations

One caution to interpreting results of cancer screening behavior from surveys is the problem of respondents correctly reporting their actual behavior. A fairly extensive literature suggests that women overreport their use of Pap tests when asked about them on surveys [46–50]. Sources of overreporting can be traced to difficulties in correctly dating events in memory and the desire of respondents to provide socially desirable answers (i.e., use of recommended preventive health practices). Despite potential problems related to accurate reporting of Pap test use, the 2000 NHIS provides valuable population-based information on how sociodemographic characteristics, risk factors, and measures of health care access contribute to Pap test use among women.

Another limitation of the NHIS is the inability to conduct analyses by state or county. Maps showing persistent geographic disparities in cervical cancer mortality in the

United States suggest that geographic disparities in screening contribute to these disparities [51,52]. Though CDC's Behavioral Risk Factor Surveillance System can be used to examine screening rates at the level of the state [53], county level data would be desirable because the location where programs are needed could be more precisely targeted, making interventions more cost-effective.

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